NUMERICAL SIMULATION OF STEADY VISCOUS FLOW PAST TWO ROTATING CIRCULAR CYLINDERS

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Abstract

The present work deals with the laminar flow of a uniform stream past two circular rotating cylinders. The principal feature of interest is that the rotation of the cylinders leads to a zero drag force on the cylinders. This case corresponds to self-propelled motion of cylinders as a coupled body. The case of equal contra-rotating cylinders is considered, with the stream normal to the plane containing the axes of the cylinders. The components of the resultant force on the cylinders are determined by the numerical solution of the incompressible two-dimensional Navier-Stokes equations in the cylindrical bipolar coordinate system. Both self-motion and towed regimes of fluid flow are considered.

Keywords: Rotating circular cylinders, viscous incompressible fluids, self-propelled